

Flight, January 1, 1910.

FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE AERO CLUB OF THE UNITED KINGDOM.

No. 53. (No. 1, Vol. II.)

JANUARY 1, 1910.

[Registered at the G.P.O.
as a Newspaper.]

[Weekly, Price 1d.
Post Free, 1½d.]



FLIGHT PHOTOGRAPHS.—An impression of the future—flying in the clouds. A clever “faked” photograph, of which so many have been given currency. It is interesting to contrast this with the genuine pictures which have formed the last two frontispieces in FLIGHT.

ONE YEAR OF FLYING AND OF "FLIGHT." A 1909 RETROSPECT.

LOOKING back over the year that has passed, everyone must realise that 1909 will go down to history as the year above all others which saw the development of the heavier-than-air machine that any intelligent and moderately athletic man could very soon master, from a more or less experimental freak, needing the master hand of a Wright or a Farman to make it perform the miraculous. The year has indeed seen many events in the aeronautical world that may without any exaggeration at all be termed literally epoch-making; for the phenomenal progress that has been made has easily outshone the rapidity with which the automobile, or any other revolutionising development, first sprang into fame. Record upon record for duration in the air, for speed, for distance, and for height have followed closely one upon another, only to be broken within the next few days or hours. Blériot triumphantly crossed the Channel on a monoplane, while later Count Lambert made an almost equally sensational trip over Paris and around the Eiffel Tower on a Wright biplane; and where at the beginning of the twelve months the number of confident flyers and their machines could almost be reckoned on the fingers of one hand, to-day their number must run well into three figures. Perhaps the most important outcome of the year's work, apart from the essential progress that has been made in every direction, is the great awakening of public and official interest in the new means of locomotion and its applications, if not to all the needs of modern life, at least to the requirements of sport and warfare. Largely, we, in this country, have to thank the Society of Motor Manufacturers for the enormous impetus directly attributable to the Exhibition organised by them, in conjunction with the Aero Club, at Olympia in March. And it is satisfactory to remember that the British Government, if it has not done quite all that we might have wished, has at length—urged forward doubtless largely by the Parliamentary Aerial Defence Committee—made a start by way of stimulating theoretical research and practical experiment in an official manner.

Although it cannot be claimed to be the result of this official activity, at least one all-British flying machine has become an accomplished fact, and famous at that, within the period under review, for the late Army aeroplane, now the personal property of Mr. Cody, has shown itself capable of efficient flight. In addition, too, Mr. J. T. C. Moore-Brabazon and Mr. A. V. Roe have each achieved striking results on home-designed and constructed machines; while the Hon. C. S. Rolls, Mr. Frank McClean, and Mr. A. Ogilvie, amongst others, have made notable headway as pilots; and a number of British manufacturing firms have made good starts in establishing themselves in readiness to cope with the new industry. It is useless to deny that Britain is still behind France, but the leeway is steadily being made up, and there is a small army of experimenters in different parts of the country who may at any time surprise the world by attaining the success for which they have long been striving. The coming year is likely to see quite as remarkable results in regard to British aviation—as an actual sport, practised by the amateur owner—as the past season has seen in respect of general progress of a technical and experimental character.

The advent of competitive flying which was instituted after the opening of the Juvisy aerodrome, and at the

subsequent meetings at Rheims and elsewhere, brought the matter of International organisation and national representation to a head much sooner than would otherwise have been the case in the ordinary course of events, and hence the year has been particularly noteworthy for the premature growth, but fortunately also for the summary disposal of those initial difficulties of rivalry and mischief-making which may ever be looked upon as incidental to the commencement of any very far-reaching movement. It was, perhaps, inevitable that these troubles should arise at some time in the early history of aviation—that newcomers into the sphere of work should endeavour to oust those who had borne the brunt of battle for many years, and who had quietly prepared the way in readiness for the long-looked-for successes of experimenters. But, that being so, Britain is indeed happy to have shaken off its over-enthusiastic "pretenders" so quickly and so easily, for the internal discord purposely caused by them, to gain their own unreasonable and selfish ends, must necessarily constitute an unwelcome hindrance to development. Fortunately, it may be claimed that flight in Great Britain is now quickly assuming a settled condition so far as national and international representation and organisation are concerned; and the policy of democratic unification that we have so consistently advocated, and that was put into practical effect by the agreement between the Aero Club, the Aeronautical Society, and the Aerial League, has been fully justified. There is little need to recall the fact that the Aero Club's attitude in regard to unauthorised meetings was fully upheld by the French Club, and that the British organisation's status as the sole representative of the International Federation was confirmed—if confirmation were needed—for the disqualification of the French aviators at Doncaster, and the events which led to it are still recent in our readers' minds. Further *contretemps* of this kind are, moreover, hardly likely to arise in the coming year, for not only is it the intention of the Federation to definitely settle upon a limited calendar of events for 1910, thereby pre-defining the exact attitude of the International organisation in regard to unauthorised events in their various countries, but stringent regulations are being introduced for International recognition whereby no future flight meetings of the money-making "circus" kind will receive the sanction—or indeed anything but the uncompromising opposition—of representative Aviation. Needless to say, therefore, the principal inducement to the stirring-up of dissension within the camp will henceforth be mercifully absent.

Passing reference must of necessity be made to the toll which has been extracted from humanity for the rapid developments of the year. But while one must deplore the catastrophes that resulted in the deaths of poor Lefebvre, Ferber, Fernandez, and the crew of the ill-fated military dirigible "Republique," one is glad that it is possible to say that those lives were given in a worthy cause. Those names will be recorded in the book of history as the names of martyrs to the interests of a beneficial science, and their heroic sacrifices will live revered in the memory of mankind as the names of Lilienthal and Pilcher live to-day.

As a conclusion to this preliminary summary, we may mention that the present issue marks the first general

anniversary of FLIGHT. January 1st of last year saw our first issue upon the bookstalls throughout the Kingdom—not to mention further afield also—and such has been the reception accorded to the journal from the very commencement that we have every reason to be pleased and proud of the result. As a weekly journal, and as the official organ of the Aero Club, we have always endeavoured both to place the latest news before our readers in the most presentable form, and to further the cause of aviation in an absolutely independent spirit by every means within our power. Such, too, we need scarcely say, form the basis of our policy for the year 1910, during which time it will ever be our sincere endeavour to make FLIGHT more and more useful each week to everyone interested from any point of view whatsoever in the marvellous new industry that we represent.

The Unbroken Chain of Events.

The events of the year have followed so closely one upon another that even now it is almost impossible to view them in their true perspective, or to judge of the relative importance of each, since even their chronological sequence is apt to be somewhat confusing. To begin right at the commencement, on January 1st, 1909, the world's record for distance was held by Wilbur Wright for 99·8 kiloms., or 62 miles 3 furlongs. It is neither necessary nor desirable to recapitulate the progressive advance of the duration record here; suffice it to say that Farman is now the world's record holder, with a flight lasting 4h. 17m. 35s., in which he is officially credited with having travelled 137½ miles, although the actual distance was undoubtedly much greater. An important stage in the progress of flight, so far as this country is concerned, was marked by the holding of the International Aeronautic Conference in London from January 11th to 13th, while the same month was also noteworthy on account of the formation of the Aerial League, by which the importance of the problem of national defence against aerial attacks was brought prominently before the public for the first time.

Quite early in the year considerable success attended Mr. Moore-Brabazon in his trials of his Voisin machine at Chalons, while towards the end of February the British Army flyer foreshadowed its subsequent attainments by making a "hop" of some 400 yards at Aldershot. At about the same time, the first real step towards the facilitation of experiment in Britain was made when the Aero Club of the United Kingdom acquired the Shellbeach flying ground at Sheppey. One of the principal hindrances to progress in this country—the lack of a suitable ground—was thus removed, and the way paved for the splendid results that have been made recently by Mr. Rolls and others in the island. An advance of even greater importance was made in March, when the Society of Motor Manufacturers and Traders held the first British Aero Exhibition at Olympia, while the awakening of official interest, which eventually took shape in the formation of the Government Advisory Committee to prosecute aerial research, was indicated by various "questions" in Parliament as to the large amount of money that had been spent by France and Germany in comparison with Britain's small outlay in connection with aeronautics.

In the same connection, it is interesting to remember that shortly after the period of which we write—at the beginning of May, to be precise, and soon after the formation of the "Flight Office"—the French Government not only set aside 100,000 francs for the encourage-

ment of aviation, as distinct from allotments for the maintenance of dirigibles, but made a grant of 43,000 francs, or about £1,700, to the Aero Club de France for the same purpose. In mentioning this grant at the present juncture we have temporarily ignored the sequence of events, for the performance of the Zeppelin airship, on March 13th, in ascending to a height of 5,640 ft. and descending safely to earth by the use of the elevating planes alone, showed conclusively that there is a distinct connection between the heavier-than-air and the lighter-than-air types of craft, and that it would be as well, for military purposes at all events, to consider the two types conjointly. It should be recalled here, too, that shortly after this notable experiment the same vessel set out upon an unusually ambitious voyage, the success of which, although marred by the final wreckage of the airship, gave the world a new insight into the practicability of the dirigible balloon. The vessel was in the air continuously from Saturday evening until Monday morning, covering some 940 miles, and the journey was only concluded then by collision with a tree, and the wreck of the airship, at Goppingen. The month of May saw an actual race between dirigible balloons, for a contest resulting in a dead heat was held over Berlin between "Gross II" and "Parseval II." It is interesting to note, as showing the great importance which was attached at that time to aerial navigation by the inhabitants of other countries than our own, that the Aerial League of Gotha (Germany), as a result of an appeal for funds to construct an airship dock at Gotha, collected over £5,000 in one week.

Turning again for a moment to notable achievements by the leading aviators, June 12th saw the first instance in which an aeroplane had carried two passengers in addition to its pilot. It is customary to regard Farman's double passenger-carrying performance at the Rheims meeting in this light, but it was only a record in the matter of length of flight under these conditions, for Blériot carried MM. Dumont and Fournier a distance of 300 metres at Issy on June 12th, and Jean Gobron also took two passengers aloft at Chalons on July 2nd.

The Channel Flight.

After the opening of the Frankfort Exhibition, the next event of consequence was again contributed by Blériot, who, after many years of experiment and disappointment, at last proved that he had hit upon a sound design by flying 25 miles across country, from Etampes to La Croix-Biquet, near Orleans. It was doubtless this fine achievement, combined with the fact of Latham's preparations at Sangatte, that suggested to him the possibility of flying the Channel, but in any case it is a matter of history that after Latham's first failure on July 19th, Blériot quietly put in an appearance, and carried off the prize at the first attempt on July 25th. Latham's bad luck in getting within a few miles of the coast, and yet failing to reach the goal two days after Blériot's success, is also sufficiently fresh in our memories to need no further comment.

In the meantime Farman and Paulhan, at Chalons and Douai respectively, were making history in their different ways, and the latter, on July 18th, succeeded in wresting from Wilbur Wright the height record by flying well above the marking balloons to an estimated altitude of 490 feet. The extent to which France realised the importance of the work then being carried on by her aviators was once again evidenced by the decoration of MM. Blériot, Delagrangé, Lévassieur, Archdeacon, and

others, as Chevaliers of the Légion d'Honneur, of which M. Surcouf (President of the Société Astra) was simultaneously made an Officier.

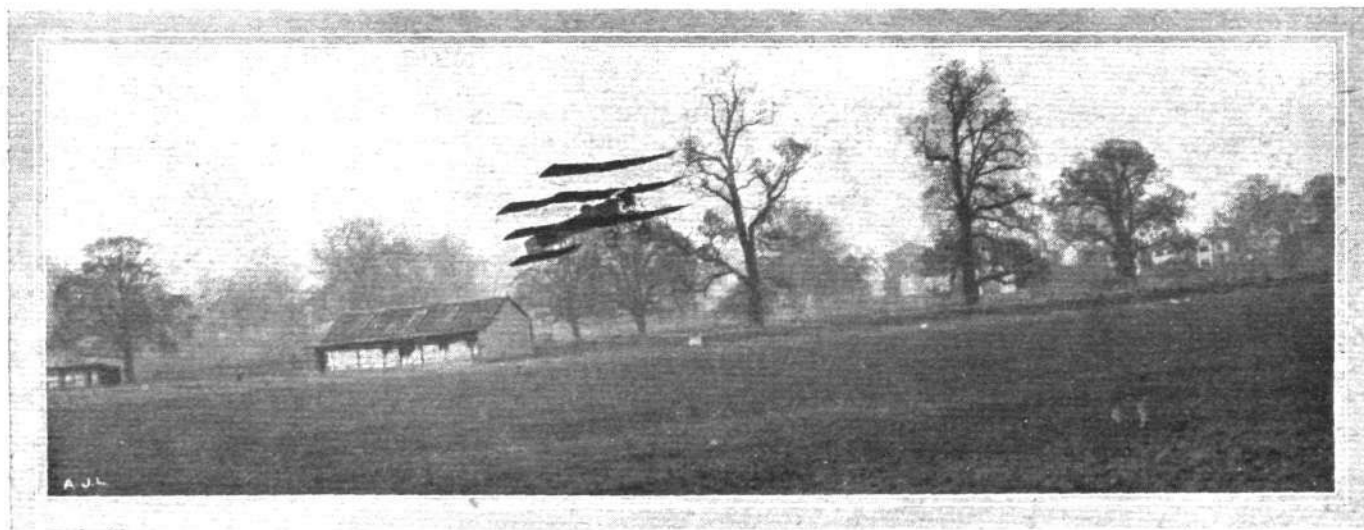
The historic *concours d'aviation* at Rheims marked out the month of August, for not only was that meeting the first of its kind, but even up to the present it has proved to be by far the most successful that has been held. As we have had occasion to remark before, the Rheims meeting commenced the run of "circuses," and the much qualified success of all its successors may be regarded as beneficial in its effect of checking the misplaced and very undesirable enterprise which otherwise might have become not only painfully evident but burdensome to the new industry, by its substitution of paid trick riding in place of legitimate sport and of healthy competition. Possible operations in this direction have been further nullified by the adjudications of the Commission Aérienne Mixte, when, later in the year, it was ruled that any surplus profits of any aviation meeting shall be directly applied to the advancement of aviation. In plain English, the result is that no meeting designed for the financial benefit of the promoters will ever again be authorised by the representative bodies.

But once again we have wandered from the strict order of events, and after the conclusion of the Rheims meeting the flight of over an hour by Mr. Cody, constituting a world's cross-country record, although not officially observed, was at that time decidedly the best performance that had been made in Britain. The Brescia, Spa, Berlin, Cologne and Boulogne meetings followed closely upon one another during September, while within the month Lefebvre was killed at Juvisy, Captain Ferber at Boulogne, and the "Republique" dashed her crew to the ground through the dislocation of her propeller-blade, and the consequent rupture of the envelope. News of the last-mentioned disaster, coming within two days of the death of Ferber, was conveyed to the French President while he was in the act of opening the second aeronautical salon in Paris, and naturally it threw a gloom over the event. At a meeting of the Aerial League to elect Lord Esher as president, on September 30th, Mr. Patrick Y. Alexander announced that he had decided to offer a prize of £1,000 for a 20-h.p. British aerial engine which, under certain conditions, would run continuously for 24 hours. Little need be said of the Blackpool, Doncaster, and Juvisy meetings, or of the action of the

Aero Club, and its subsequent complete justification in regard to the first two. Of greater historical and picturesque interest was the flight of the Comte de Lambert from Juvisy to Paris and back, in the course of which he circled around the Eiffel Tower; the four-mile flight of the Baronne de la Roche—the first lady pilot—at Chalons, and the circular mile flight by Mr. J. T. C. Moore-Brabazon, at Shellbeach, which won the *Daily Mail* prize of £1,000. Farman's latest world's record was made on October 27th, at Chalons, when he was officially credited with having flown 137½ miles in rather more than 4¼ hours. On the last day of October Herr Grade, in his monoplane, won a £2,000 prize offered to the first German to fly in a figure-of-eight round two posts placed one kilometre apart; while Paulhan secured the British height and circular mile records at Sandown Park on November 6th, after having given a series of demonstration flights at the new Brooklands "aerodrome."

It was a happy idea that suggested itself to Mr. Moore-Brabazon as a variation to the monotony of prize-winning to prove that pigs *can* fly by carrying one of those despised quadrupeds with him on his machine at Sheppey. Latham's 20-mile trip to the shoot of the Marquis de Polignac was probably dictated by similar motives. On the strictly serious side of aviation, however, Latham had been far from inactive, for after alternate rivalry between himself and Paulhan, he succeeded on December 1st in carrying the height record to 475 metres, or 1,550 ft., in spite of a wind blowing some 36 miles an hour. Five days later, news was received of the death of Fernandez at Nice through the breaking of his elevator-controlling cord. The year was practically concluded by the Aero Club's annual dinner on December 15th, when the Duke of Argyll presided.

Altogether it has been a year of intense and constant activity on the part of Governments, organisations, and individuals; and the results of this activity have been manifested in every direction. So far as England is concerned, the coming year will see the formation of the nucleus of an aerial fleet—thanks largely to the energy of the *Morning Post*—while the aeroplane experiments that are being carried out at Brooklands and at Shellbeach, as well as in secrecy elsewhere, may be expected to place England in a considerably better position than that in which she finds herself to-day.



Mr. A. V. Roe, on his triplane, flying at Wembley on Friday of last week.—Our photograph was taken during the first flight.

"Flight" Copyright Photo.

LEADERS IN FLIGHT.



MR. ROGER W. WALLACE, K.C.,
Chairman of the Aero Club of the U.K.

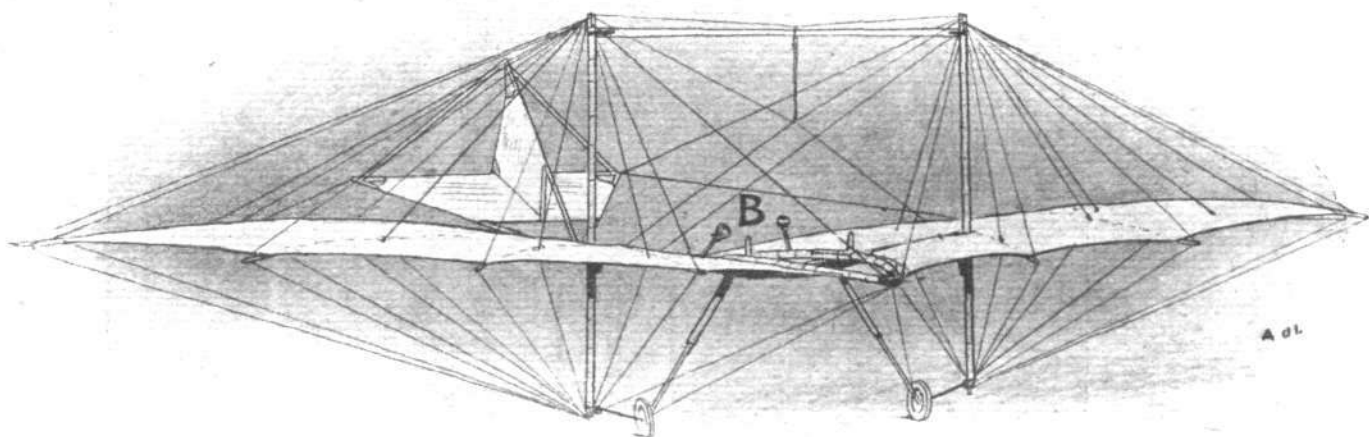
The Pilot's "Seat" and its Consequences.

Although Pilcher was doubtless inspired to his work by Lilienthal's example, it is apparent that he brought an original mind to bear in the constructive details of his task, whatever bias he may have been under to follow his leader's methods in their general lines. Constructionally the two gliders are as different as they can well be for machines of such similarity in size and purpose. But Pilcher and Lilienthal had this much in common, that they both employed the same method of riding their machines, by hanging upon them, and from such experience as has since been collected by the Brothers Wright, there is little doubt that the custom was at the bottom of many of their difficulties, if not actually the cause of Lilienthal's death. One consequence of deciding to use a glider as Lilienthal and Pilcher used

Pilcher had quite satisfied himself upon this point before he came to the end of his experiments, and another matter upon which he became convinced was that the upward slanting of the wings—or the principle of the dihedral angle—resulted in diminished stability in side-wings.

Leading Dimensions.

Of the two machines there is little to choose in weight, as they were both supposed to be in the order of 45 to 50 lbs. when actually in use. Lilienthal's glider has the smaller amount of supporting surface, and even that machine must have been one of the largest he constructed, for he was inclined at first to build gliders having barely 110 sq. feet of deck. The span of 22 feet for the Lilienthal machine is 2 ft. 8 ins. less than the Pilcher,



"Flight" Copyright.

View of the Pilcher glider from in front, showing the method of staying the wings. One hundred wires were employed for this purpose. In the centre of the machine will be noticed two short posts capped with small bolsters marked B. In use they came beneath the arm-pits of the pilot and supported his weight, whilst his fore-arms rested along the frame, and his hands grasped a pair of small handles which are also visible in the sketch.

theirs is the necessity of designing a machine of small weight, for the pilot has to be prepared to carry the load both when launching and landing. Pilcher, it is true, fitted a small chassis to his glider consisting of two spring-suspended wheels, but this addition was no more than a compromise, as its purpose was mainly to enable him to bring the machine more easily into position, and to take some of the initial shocks of landing. In flight Pilcher's body hung suspended beneath the wings, only his head and shoulders projecting above, his weight was borne upon two bolsters fitting under the armpits. Lilienthal was perhaps even more beneath his machine than Pilcher, for his arms rested in sockets beneath the wings, and the bolsters which supported his shoulders were about on a level with the upper surface.

Stability and Control.

The greater part of their weight being thus suspended beneath the supporting surfaces caused the centre of pressure to be considerably above the centre of gravity, and although this is often thought to be conducive to automatic stability by constituting a kind of natural pendulum, as a matter of fact, the inertia of such a system very naturally complicates the control, which in both cases was carried out by the shifting of the pilot's body in whatever direction might be required to restore balance.

and the overall length is 2 ft. shorter. The height is proportionally much less than that in the Pilcher glider, owing to a different system of staying the surfaces and to the absence of a chassis.

The Tail.

Both gliders were fitted with tails of similar type although different in shape, the tail in each case consisting of one vertical plane and one horizontal plane, the latter being set at a negative angle, and being also free to rise unrestricted if subjected to any pressure from beneath. It will be distinctly noticed from the accompanying drawings that the stay wires for the horizontal planes are only arranged so as to resist pressure from above. The vertical tail plane is nominally rigid, although, in the Pilcher glider, it happens to be mounted upon the horizontal member, and thus moves with it. In the Lilienthal machine the horizontal plane is hinged separately to the vertical plane, which is attached rigidly to the main frame. It was Pilcher's object in designing the tail of his machine as shown, to make it as compact as possible for storage, and with this end in view the tail was arranged to fold over on to the main planes.

(To be concluded.)

The Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Subscriptions.

Members who have not already given instructions to their bankers are reminded that their subscription is now due. Cheques should be made payable to the "Aero Proprietary, Ltd.," and be crossed "Barclay and Co., Ltd." Amount £2 2s.

Gordon-Bennett Aviation Cup.

This Cup, in 1909, having been won by America, in accordance with the rules the competition in 1910 will take place in the United States.

In order to comply with the regulations it is necessary, if the Aero Club of the United Kingdom desires to contest the Cup, that the challenge should reach America by 1st March, 1910.

The Committee of the Aero Club of the United Kingdom will select the three competitors to represent the Club, and intending candidates are requested to notify the Secretary on or before February 22nd, 1910, of their willingness to compete, if chosen. Applications must be accompanied by a cheque for £20, the entry fee, which amount will be returned should the competitor not be selected.

Candidates must be members of the Aero Club of the United Kingdom.

The full rules governing the contest can be obtained from the Aero Club of the United Kingdom.

The Gordon-Bennett Balloon Race.

This race will take place in America in 1910, probably about October.

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candidates are requested to notify the Secretary on or before February 22nd, 1910, of their willingness to compete if chosen. Applications must be accompanied by a cheque for £20, the entry fee, which amount will be returned should the competitor not be selected.

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Aero Exhibition at Olympia.

The Society of Motor Manufacturers have decided to organise an Aero Exhibition under the auspices of the Aero Club of the United Kingdom, to be held at Olympia in March next. Members wishing to exhibit full-sized aeroplanes are requested to communicate with the Aero Club as soon as possible.

It is also proposed to organise an exhibit of model flying machines. Those desirous of exhibiting are requested to make application to the Aero Club. Free space will be given to model exhibitors, and prizes will be awarded, particulars of which will be announced later.

A circular has been sent round to all the Provincial Aero Clubs inviting their members to exhibit models.

New Premises.

It is hoped that the new premises will be ready for occupation on Monday, January 3rd, when Members will benefit by all the advantages of a club-house, with the exception of a dining-room, which the Committee do not think necessary for the present.

E. CLAREMONT, CAPT. R.N.,
HAROLD E. PERRIN,

Joint Secretaries.

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

(NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary.)

Aeronautical Society of Canada (TORONTO).

THIS Society is now formed, and the following are the officers: F. B. Fetherstonhaugh, president; E. B. Merrill, vice-president; M. B. Logan, secretary; G. N. Thomas, treasurer; and a committee. The Society is still, of course, very small, but there are already six men who have built full-size machines, three of which have already flown, particulars of which we hope to be able to give later in an article. This does not include Professor Graham Bell, who is also a member of the Society, nor Sir Hiram S. Maxim, who is an honorary member. The difficulty of organising a club in Canada is far greater than that of the Old Country, on account of the absence of men of leisure, able to give up their time to its organisation and development. However, it is hoped in the near future, as there are several members of considerable means who have joined the club, to make things go.

Aviation Association of Ireland (HOTEL METROPOLE, DUBLIN).

IN our last issue we briefly referred to the formation of this Association in Dublin for the study of the technical, scientific and practical sides of flight, and which we understand will in no way clash with the interests of the recently formed Aero Club of Ireland, which caters for the sporting side of aviation.

A further meeting will be held on Friday next, 7th inst., for the purpose of electing officers and the formal business of inaugurating the new Association.

Meetings will be held for the discussion of aeronautical topics and the reading of papers on subjects pertaining thereto. Model flying competitions and exhibitions will be held from time to time, and the technical side of aviation in Ireland will be generally encouraged. The subscription will be only nominal.

Further information can be obtained from the Hon. Secs. at the above address.

Berkshire A. and Ae. C. (10, REDLANDS ROAD, READING).

AT a special general meeting of the Berkshire A.C., held at Reading Town Hall on Wednesday, 22nd ult., it was decided to

change the name of the club to the Berkshire Automobile and Aero Club. It was also resolved to associate with the Royal Automobile Club, but the question of affiliation to a central aeronautical body was left in the hands of the committee. During the same afternoon Dr. H. S. Hele-Shaw, F.R.S., gave a lecture copiously illustrated by lantern slides, cinematograph films, and models, on "Aerial Automobilmism." The profits of the lecture will be given to the Royal Berkshire Hospital.

Irish Aero Club (34, DAWSON STREET, DUBLIN).

SIR WM. G. D. GOFF, BART., has been elected President of this club, while the Committee consists of Sir Henry Grattan Bellew, Bart., Sir John Nutting, Bart., Mr. John Dunville, Mr. J. T. C. Moore-Brabazon, Major Crookshank, Mr. G. H. Ferguson, and five members of the Irish A.C. Committee: Mr. R. F. H. White, Mr. W. H. B. Moorhead, Major Wellesley, Mr. J. M. Davies, and Mr. J. C. Percy. The annual subscription has been fixed at one guinea.

Yorkshire Aero Club (Yorkshire Post BLDGS., ALBION ST., LEEDS).

ON December 21st, Mr. R. J. Isaacson, of Leeds, delivered the weekly lecture to the members of the Yorkshire Aero Club, the meeting being held in the Leeds Exchange. The subject was "Flight Engines," and the lecturer stated that lightness, simplicity, and reliability were the chief points to be aimed at. The system of designing employed in regard to motor cars could not be followed. Up to the present the English firms had only attempted to obtain efficiency by lightening their ordinary design, whereas the French had begun on fresh lines with more success. The greater number of successes had been obtained from the semi-radial, using three cylinders, or six or seven cylinders placed round the crank. Interest was added to the lecture by the exhibition of an engine which is being built to the order of a French gentleman by Messrs. Manning, Wardle, and Co., of Leeds.

AERIAL LEAGUE AND THE GENERAL ELECTION.

WE have received from Mr. Stephen A. Marples, the Secretary of the Aerial League, a copy of a letter which is being sent to each candidate for Parliament at the forthcoming General Election, in order to obtain an idea as to the support they will give, if elected, on matters of Aerial Defence. The letter and attached form read as follows:—

"SIR,—I am requested by the Executive Committee of the Aerial League of the British Empire—which is a patriotic and non-party organisation—to enquire, for the purposes of publication, should you be elected as a member of the forthcoming Parliament, if you are prepared to support a vote for supplies for furnishing our country with adequate means of Aerial Defence, in view of the actual position already secured by neighbouring Continental Nations in this important matter.

"It is definitely known that Germany will have 'in being' an Aerial Fleet of nineteen vessels by the end of the year, and that this will be increased in the near future to twenty-five; it is further reported that by the next manoeuvres Germany will possess sixty-five Airships. France, Austria, Russia, Italy, and the United

States are all moving in the matter of the provision of aircraft with energy and foresight.

"In order to save you as much of your valuable time as possible, I enclose a form and a stamped addressed envelope, which I shall be much obliged if you will kindly fill in, and return to me at your earliest convenience.

"I am, Sir, your obedient servant,
STEPHEN A. MARPLES, Secretary."

"Date..... 19..

"To the Secretary, Aerial League of the British Empire,
Carlton House, Regent Street, S.W.

"SIR,—I am.....* prepared, in the event of my election to Parliament, to vote for the immediate provision, for the sufficient and efficient defence of the United Kingdom against Aerial Attack, of such means as are necessary in the opinion of the Naval and Military advisers to the Government:

"I am.....* prepared to refer to the importance of this matter in my election address.

"Yours faithfully,

"..... (Signature).

"(Constituency)....."

"* In the event of your not agreeing, please insert the word 'NOT.'"

"FLIGHT-GOLF."

FROM many and diverse quarters our suggestion of Flight Golf as a live game for model flyers has obtained strong approval, and developments are likely to be in evidence shortly. This week's *Punch* honours it by a long reference, a distinction which, handed down from ancient times, at once brings it within the range of a serious subject worthy the notice and consideration of one and all. *Punch's* remarks and humorously perfect "rules" are as follows:—

"A combination of two popular sports is suggested in FLIGHT. It is to be called 'Flight Golf,' played with model aeroplanes. The competition consists in the attempt of each operator to fly his model from hole to hole in a less number of separate flights than his opponent. According to its originator, for the moment there is no need for the more enterprising of his readers to wait for any rules at all. We think this is a mistake, and hasten to supply some rules, and for the real article, in preference to mere toy machines:—

"1. A full-sized course shall consist of eighteen holes from fifty to one hundred miles apart, the holes consisting of any convenient chalk or gravel pit.

"2. The aeroplanes shall tee off from the racecourse or football ground nearest to the previous hole, the use of pylons and starting-rails being disallowed.

"3. Aviators shall be permitted to address their machines, their mechanics, or the bystanders in any language they prefer, always provided that it is not calculated to provoke a riot.

"4. False starts, apologies for failure of the motor, or running along the ground for more than a hundred yards, shall be deemed to be 'foozling,' with a penalty of the loss of a flight.

"5. If the aeroplane lie in water, the driver, unless drowned, may take it out, rinse it if he pleases, and play from behind the hazard, losing a flight.

"6. Whatever happens to an aeroplane by accident, such as colliding with a tree or chimney-stack, coming to pieces in mid-air, &c., must be reckoned 'a rub on the green,' and submitted to.

"7. If the driver or his mechanic strike the opponent's machine in any manner, that side loses the hole.

"8. In match-playing, an aeroplane lost entails the loss of the hole, unless any machine that has started off without an occupant be recovered within twenty minutes.

"9. If an aeroplane be completely invested with fog, brushwood, haystacks, &c., only so much thereof shall be set aside as will permit the player to have a view of the landscape before he plays.

"10. No houses, growing trees, railway embankments or other impedimenta may be removed when a machine is bunkered.

"11. If an aeroplane splits in two or more pieces, a fresh machine shall be put down where the largest portion lies.

"12. Any aeroplane that stymies another must be wheeled aside and carefully replaced.

"13. On all occasions a two-plane match may pass a party playing three or more planes."

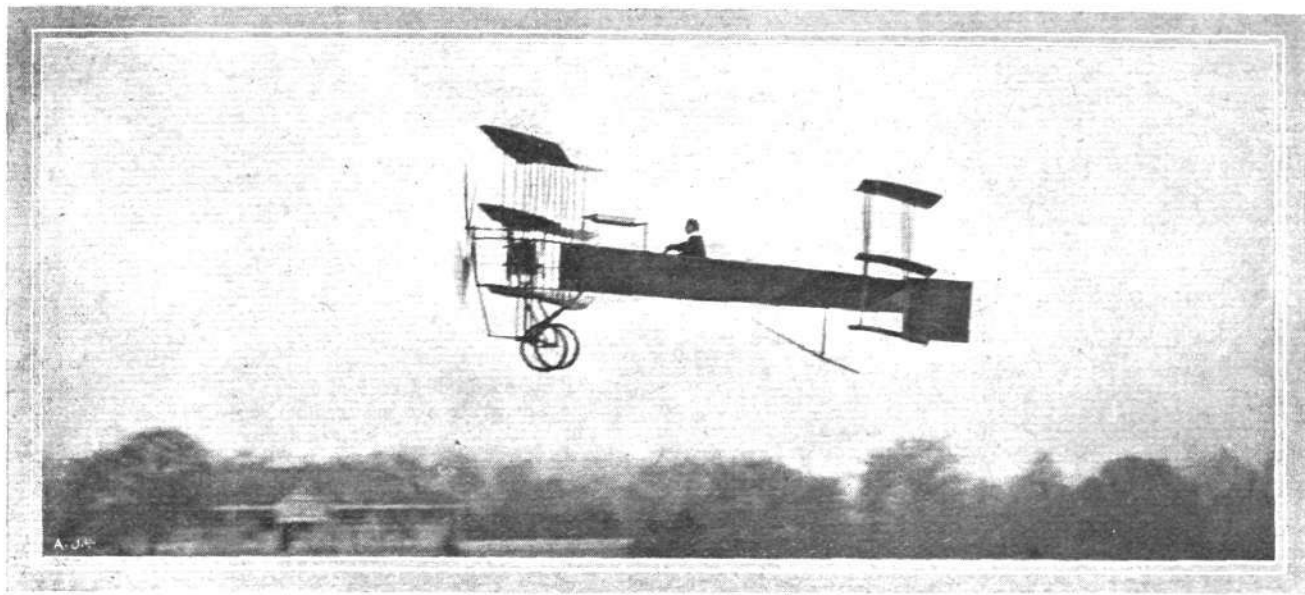
NEXT PARIS SHOW.

ALREADY the work of organising the second International Flight Exhibition at the Grand Palais is well in hand, and the opening date has been fixed for October 15th next. The exhibition will remain open for fifteen days. It will be under the patronage of the Aero Club of France and the Fédération Internationale Aeronautique. As last year, M. Robert Esnault-Pelterie is President of the Executive Committee and Commissaire Général.



Herr Etrich, the successful Austrian aviator, whose machine we illustrated last week in full flight.

AVIATION NEWS OF THE WEEK.



"Flight" Copyright Photo.

Mr. Roe, at Wembley on Friday of last week, in full flight immediately before the mishap.

Mishap to Mr. A. V. Roe.

AFTER making several good flights at Wembley Park Mr. A. V. Roe had a slight mishap on Christmas Eve, of which we are able to give a snapshot. Mr. Roe endeavoured to turn sharply, but as a result of some recent modifications in the steering arrangements, found it impossible to rectify the tilting movement quickly enough, and this caused the machine to fall, damaging one of the planes. Just previous to this Mr. Roe had made several very successful flights of 400 to 500 yards in length. The damage Mr. Roe hopes to have repaired shortly, when he will make further attempts.

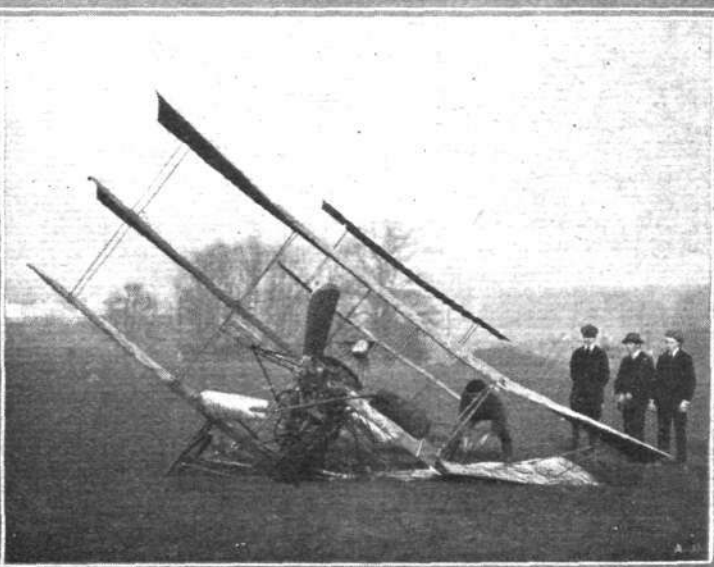
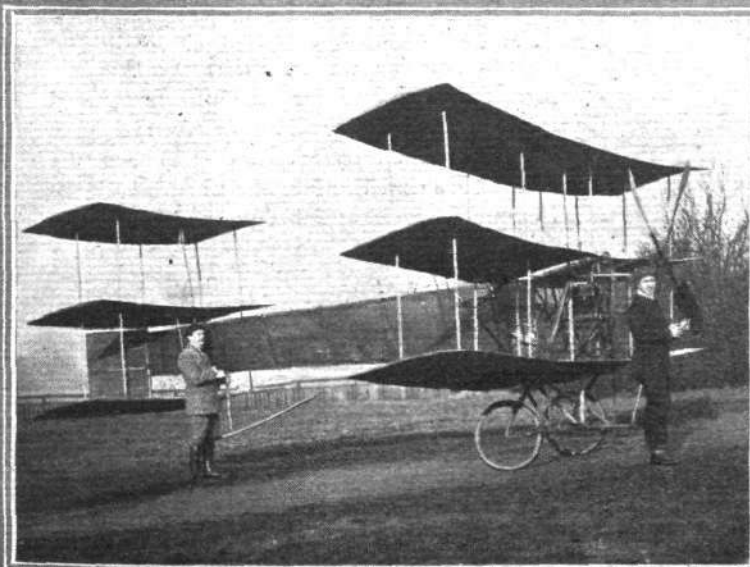
Liverpool to Manchester.

On Wednesday Mr. Cody made an attempt to win the £1,000 prize offered for a flight from Liverpool to Manchester. He made a good start from the Aintree Racecourse at 12.15, but he only reached Eccleston

Park, about ten miles away, when he decided to abandon the attempt on account of the fog, which made it difficult for him to steer clear of telegraph wires, and other such obstructions. On reaching the Park, he suddenly came upon some overhead wires, and being unable to rise quickly enough to clear them, was obliged to come down, which he accomplished without difficulty. The arrangements were in the hands of the *Liverpool Post*. Mr. Cody did not steer a direct course, keeping somewhat to the north, and he covered about thirteen miles in twenty minutes.

Practice at Issy.

DURING the last week there has been little doing at Issy. Rougier has been making one or two modifications to his Voisin biplane and tuning it up, and M. Penteado has been practising on his diminutive monoplane. Only



"Flight" Copyright Photo.

Mr. A. V. Roe and his successful triplane flyer at Wembley.—On the left Mr. Roe is standing by the four-bladed propeller of his machine, and the picture on the right shows the machine immediately after the accident on Friday of last week.

one of the Blériot pupils, M. Plessety, has been practising, and on the 21st ult., during a trial flight, the machine fell to the ground owing to one of the wings catching a bush when turning.

High Flying at Chalons.

ANOTHER promising pupil of the Farman school is M. Frey, who at his fourth lesson on the 21st ult. was able to fly five times round the course, rising at times to a height of 20 metres, and passing over telegraph wires and trees. Kuller, on the same day, had another nasty mishap with his Antoinette, one of the propeller-blades falling off, and causing the machine to drop from a height of 10 metres. The following day, in spite of the strong wind, Mr. Latham went up, and flew for 25 to 30 kiloms., during which the maximum altitude was 250 metres. For the next three days a tempest raged over the camp so that flying was impossible, and although the wind had not moderated very much on Sunday last, Mr. Latham ventured up, and attained a height of 292 metres. He had intended to beat records, but the state of the weather rendered that out of the question. He, however, secured the de Caters height prize offered by the Ligue Nationale. Mr. Latham also made a flight of 39 mins. on the Antoinette monoplane which has just been delivered to Mr. Harkness. Duray, de Baeder, and Henry Farman also made one or two short trials on their biplanes.

In view of the probability of several attempts being made to win prizes which were only open to the end of the year, MM. Archdeacon and André Fournier, the official observers of the Aero Club of France, arranged to stay at Chalons until to-day, Saturday.

M. Blériot Better.

OUR readers will be pleased to hear that M. Blériot is making good progress towards recovery from the effects of his accident at Constantinople, and on Christmas Eve he arrived at his home at Neuilly. M. Blériot will pro-

bably now go on to Pau, and spend some time there, and also at his works at Croix d'Hins.

Activity at Pau.

THE outstanding event of the week at Pau was the flight of Balson on Sunday last, when he flew for over an hour on his Blériot. On the 21st ult. Prince Bibesco and M. Aubrun, having completed their training, left the aerodrome, and their places were taken by MM. Deletang and Jaluze. The other pupils, M. Mamet, Comte de Vogue, M. Duval and Miss Spencer, are all making good progress. On the 28th ult., M. Leblanc flew for 34 mins. at a height of 40 metres, when a mishap to his motor caused him to land. Some of Mr. Latham's machines have arrived at Pau, but their sheds are not yet ready.

At the Wright aerodrome M. Tissandier has been continuing lessons to Count Malinski and MM. Gasnier and Zens, and on Christmas Day he made two flights of fifteen minutes each with a passenger.

Arrangements are being made to test the dirigible "Espana" at Pau. A shed has been built for it, and gas plant laid down for inflating purposes.

Molon at Havre.

ON the day before Christmas Molon had a busy time. During the morning he made seven flights on his Blériot, the duration of each ranging from seven to sixteen minutes, while in the afternoon he made four flights of ten minutes each, sometimes venturing as high as sixty metres.

On Monday he had a slight mishap. Falling from a height of 25 metres, the front wheels embedded themselves in the sand, causing the machine to turn over.

The French Michelin Prize.

WE go to press too early this week to be able to record the actual result of the Michelin competition for 1909, which closes on the last day of the year, and it will be remembered that the flight with which Wilbur Wright secured it last year was made on the last day. Three flyers had formally entered, viz., Henry Farman, Latham and Chateau. At the time of writing, Farman's record of over four hours stands first.

For South America.

AMONG the cargo on the French liner "Parana," which left Marseilles on the 24th ult. for America, was included six aeroplanes, three Voisins, one Santos Dumont and two Blériots. These are all being taken to Argentina and Brazil by M. Louis Moriaud, who announces that the pilots, Aubrun, Edwards, Pecquet, Richet and Bregi will be flying out there before long.

Signs for Aviators.

IN view of the probability of a large number of town-to-town flights being made in the neighbourhood of Pau in the near future, the Aero Club of Bearn, of which M. Tissandier is President, has addressed a letter to the Mayors of the various towns in the district asking them to take some steps to afford facilities to aviators in this direction. It is proposed that the name of the town should be painted in white letters on a black ground on the roof of the most prominent building.



BLERIOT'S ACCIDENT IN CONSTANTINOPLE.—The crazy houses in the Tetavia quarter against which M. Blériot's monoplane was driven by the boisterous wind when he, to please the crowd, undertook his hazardous flight on December 12th on the Tuscum military field at Pera. Our photograph shows the machine as it fell across the centre palings of the two back yards.

The Cairo Meeting.

AMONG the competitors at the Heliopolis meeting from February 6th to 13th will be the two Humber-built Blériot monoplanes which Mr. Ballin Hinde has taken out to Egypt. They are fitted with Humber 3-cylinder engines and equipped with dual ignition. Mr. Ballin Hinde, we understand, has expressed the opinion that the Nile district is ideal for practising flying.

Flying in Algeria.

ON Christmas Day, M. Metrot, on his Voisin biplane, made two trials, one of 14 and the other of 16 minutes duration, while the altitude varied between 30 and 150 metres. On the following day M. Metrot flew from his hangar at Joinville to the racecourse at Boufarick, 14 kiloms. away, landed there without difficulty, and later in the day made the return trip to Joinville.

A New German Aeroplane.

ACCORDING to our German contemporary *Morgenpost* very satisfactory results have been obtained with a new aeroplane built by Herr Max Kuhn, of Berlin, to the order of Herr Alex Alper. It is reported that a flight of about 80 kiloms. at a height of ten metres has been made, and the promised trials in public will be awaited with interest.

Contests for Switzerland.

THE first flying meeting in Switzerland is to be held from the 2nd to the 4th inst. at Colombier, close by Neufchâtel, and it is said that two Blériots, a Voisin and a Dufaux have been entered.

A programme of flying events suitable for Switzerland has been drawn up by M. Emile Durer. He suggests flights across Lake Geneva in all directions, a flight over the Alps, a cross-country trip from Geneva to Nyon and Lausanne, while the Grand Prix should be for the best flight made from Geneva to Evian les Bains and back in a single journey.

A Swiss Aerodrome.

THE Count de Viry has decided to construct an aerodrome in his grounds at Viry, near Geneva, with a view to encouraging flight in Switzerland. At present there are four aeroplanes there, and two more are expected almost at once. One of these is the Dufaux biplane which, as we announced last week, has made one or two short flights, and promises well.

Flight Meeting at Florence.

FOR the flying week, which it is proposed to hold at Florence in the early days of the coming spring, the municipality have voted £2,000, and it is expected that the total prize money will reach £8,000. The work of preparing the aerodrome is now being actively pushed on with.

A New British Firm.

ONE of the latest British firms to take up the business of aeroplane building is Messrs. A. V. Roe and Co., under the management of Mr. A. V. Roe, who was one of the first Britishers to fly on a power-driven machine. His lengthy connection with experiments in the art of flying should prove of valuable assistance in the building of machines. We understand that the standard range of machines which it is proposed to put on the market will include monoplanes, biplanes, and triplanes.

AIRSHIP AND BALLOON NEWS.

"Zeppelin III" Not Bought.

FROM Friedrichshafen comes a rumour that the German War Office have decided not to purchase "Zeppelin III," which after its journey to Berlin was offered to them for £28,000. This decision is said to have been reached because of the many improvements made since the vessel was built, especially in the introduction of electrum into the framework of "Zeppelin IV," by which the weight is considerably reduced.

Clement-Bayard Airship.

ALTHOUGH Mr. Arthur Du Cros, M.P., secretary of the Parliamentary Aerial Defence Committee, states that the Clement-Bayard airship is now ready to make the journey from Paris to London, it has been decided to postpone the voyage until after the General Election. The object of bringing the vessel over here is to make an impression on the public mind and to interest members of Parliament by taking them for trips over London. It is felt that this object would be defeated at the moment when all interest centres in the forthcoming elections.

And so the *Daily Mail* garage at Wormwood Scrubbs will have to wait patiently for another couple of months for its guest.

The Spiess Dirigible.

THE full specification and working drawings of the rigid dirigible, which was offered to the French Government some time ago by M. Spiess, have now been sent in to the Minister of War. The dimensions of this dirigible are: length of envelope 88 metres, while the diameter is 12 metres. The capacity is 8,000 cubic metres, there are eleven internal ballonettes, and the two motors of 120-h.p. drive four screws 4 metres in diameter.

"Zodiac III" Wins a Prize.

ON the 27th ult., Count de la Vaulx, with "Zodiac III," made an attempt to win the Giffard prize offered for the best performance, before the end of the year, by a dirigible over a closed circuit. In spite of the rain and fog, leaving its shed at 2 p.m., the dirigible started off at 2.43 over a circuit comprising Rambouillet, Trappes, and Le Mesnil. Eventually it came to rest at 4.40 p.m. when darkness came on.

New Italian Military Dirigible Station.

A CONTRACT has just been let by the Italian Government for the construction of a new balloon shed at Verona which will house two dirigibles of the type which have been so successfully experimented with at Bracciano. It will be erected at a cost of £20,000, under the superintendence of Col. Morris, who has been in charge at Bracciano.

Country House Ballooning.

ON the 27th ult., the Hon. C. S. Rolls ascended in a balloon from the Hendre, Monmouthshire, Lord Llangattock's country house, taking as a passenger Major B. Baden-Powell. A descent was made at Gloucester soon after dusk.

⊗ ⊗ ⊗ ⊗

An Address Wanted.

MR. P. G. RANDALL, who has written to Mr. John F. Rennie regarding rubber cord, omitted to mention his address. Will he kindly send this along, so that his requests may be complied with?

CORRESPONDENCE.

* * The name and address of the writer (not necessarily for publication) MUST in all cases accompany letters intended for insertion, or containing queries.

NOTICE.—Correspondents asking questions relating to articles which they have read in **FLIGHT**, would much facilitate our work of reference by kindly indicating the volume and page in their letters.

FRAMEWORK FOR MODELS.

[257] I notice that in your issue of December 18th, your correspondent, Mr. L. Mortelmans, of Harringay, inquires as to where he can obtain materials for making the framework of a model monoplane.

I am sure he will find that the following can supply him with what he requires :—

The Model Aero Accessories Co., Ltd., 64A, London Road, Greenwich; or C. Lucas, "Hobbies" Depôt, 116, Dale Street, Liverpool.

Wishing **FLIGHT** every success,
Chelsea, S.W.

A. TRIDON.

[258] In reply to L. Mortelmans' inquiry for wood for model-making, we supply square wood in all lengths, from 1 in. square down to $\frac{1}{16}$ th in. square; also round cane in all sizes, from $\frac{1}{16}$ th in. square upwards.

26, Clarges Street, Piccadilly, W.

COCHRANE AND CO.

[259] In answer to L. Mortelmans' inquiry as to framework for models, I may state that C. Lucas, 116, Dale Street, Liverpool, supplies birchwood sticks $\frac{1}{8}$ in. by $\frac{1}{8}$ in. and $\frac{3}{16}$ in. by $\frac{3}{16}$ in. in 3 ft. lengths at 1d. per length.

Last week he supplied me with a quantity, and I find them very satisfactory.

Jermyn Street, W.

NEMO.

[260] I see that one of your correspondents wants to know where he can obtain wood for the framework of a model monoplane. The following are useful sizes supplied by the Melton Aeroplane Co., of 38, Nottingham Street, Melton Mowbray :—

Boxwood slips, planed two sides: $\frac{1}{8}$ in. square by 3 ft. 3 ins., 2½d. each; $\frac{1}{4}$ in. square by 3 ft. 3 ins., 3½d. each.

I use these as ribs.

Hickory sticks, planed true: $\frac{1}{8}$ in. by $\frac{3}{16}$ in., $\frac{3}{16}$ in. by $\frac{1}{8}$ in., $\frac{1}{4}$ in. by $\frac{1}{4}$ in., $\frac{1}{4}$ in. by $\frac{3}{16}$ in., $\frac{3}{16}$ in. by $\frac{1}{4}$ in., $\frac{1}{2}$ in. by $\frac{1}{2}$ in. Price 1d. a foot.

Silver spruce: $\frac{3}{16}$ in. by $\frac{3}{16}$ in. by 5 ft. 6 in., $\frac{1}{4}$ in. by $\frac{1}{4}$ in. by 4 ft., $\frac{1}{2}$ in. by $\frac{1}{2}$ in. by 4 ft. Price 2d. a foot.

Melton Mowbray.

A. BOTTOM.

[261] With regard to timber for models, I should like to recommend Messrs. Fentum, Phillips and Co., of Guildford Electrical Works, Guildford, who supply wood $\frac{3}{16}$ in. by $\frac{1}{4}$ in. at 6d. per dozen lengths of 2 ft. each, and American lime for making planes $\frac{1}{8}$ in. thick 4d. per sq. ft.

Wishing your paper every success.
St. James' Place, S.W.

C. EVERETT.

TIMBER.

[262] I notice in your issue of December 11th that Miss Lilian E. Bland, of Belfast, in a most interesting letter on the subject of wood-built gliders, states that ash is better than spruce for spars. Now the experience of all naval architects who have had anything to do with racing yachts is exactly the contrary, as all racing spars, at any rate up to 50 ft. or so, are now made of silver spruce, as being the stiffest and toughest wood for its weight and strength. No doubt ash would be best for runners.

Of course, we always use hollow spars for the smaller craft, and in very small boats piano-wire rigging has been in use for years.

It may interest you to learn that a hollow silver-spruce spar, 2 in. diameter in centre, 1½ in. at one end and 1 in. at the other end, proved to be about 20 per cent. stiffer than a bamboo of equal length (12 ft.) and diameter. It was also over 10 per cent. lighter.

Strand, W.C.

LINTON HOPE.

[Our correspondent is the well-known naval architect, who is much interested in the comparative problems provided by the racing yacht and the aeroplane.—ED.]

[263] With regard to Mr. Bath's letter, ash v. spruce, which is very interesting, he overlooks, I think, the fact that deal is considerably heavier than either ash or spruce, and also that the advantage of ash is its springiness; a stiff wood would be much more liable to snap off under sudden strain than one that will give and

bend a certain amount. I don't profess to be an expert on wood, but the majority of aeroplane firms use ash for main spars, and sometimes hickory for the ribs.

The Wrights, and I think also Curtiss, use Oregon spruce, which is also extensively used at Woolwich Arsenal.

With regard to "dead" knots in spruce, one has, of course, to choose timber free from knots of this description; there are so many different kinds of spruce that I have to take the word of my carpenter for what I am using. I could not get "Oregon," so the ribs are made of "sugar pine"; this has no knots, it steams well to its curve, and is apparently strong; my main spars are of ash.

The Farman machine at Blackpool was also made of ash, the stanchions are all chosen with the grain running vertical, which is what, I suppose, Mr. Bath means by putting "the 'root' end at the bottom."

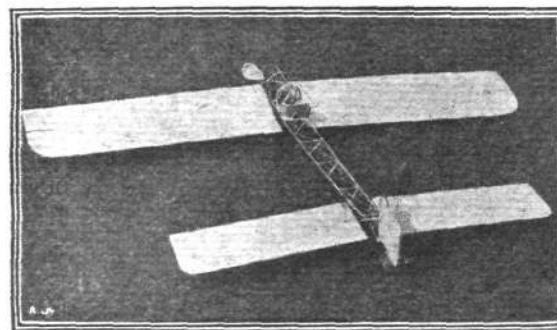
Bending Bamboo.—Can any of your readers tell me how to bend bamboo to a curve. Should dry heat or steam be used?

Belfast.

LILIAN E. BLAND.

INCH TO THE FOOT SCALE MODEL.

[264] * I am sending you a photograph of an aeroplane one inch to the foot scale, of my own design, the main dimensions being as follows: Span, 30 in.; aspect ratio, 6.



The planes are made of white holly, steamed and planed to the required shape. Two side hand-wheels operate the rear planes, and a single wheel seen in front of the seat works the vertical rudder. Hoping this may interest you, and wishing your paper every success.

Twickenham.

F. M. REILLY.

FLAPPING-WING MODELS AND SOME ADVICE.

[265] May I call your attention to the error made by your correspondent Wynn re propellers. He states, in No. 50, that the area of 3½ ft. diameter is 9½ ft. Molesworth says that the area 3 ft. 6 in. diameter is 10.99 ft. The base of calculations of your correspondent being wrong, the product must be erroneous.

May I suggest to correspondents the advisability of being clear and explicit in their communications, remembering that the bulk of your readers have had little or no mechanical training or education.

I have devoted some time to aviation, and I am just completing a full set of drawings of a mechanical flyer. Perhaps it may be of some interest to you to know what is being done in a quiet way.

In my mechanical flyer I have the following motions :—

First. The wings will flap like the wings of a bird.

Second. You will have observed that a bird when ascending has the fore part of the body above the horizontal line, and when descending, below; consequently, the wings in each case have the same angle. My second motion produces the same effect while the wings are in operation.

Third. The bird, when in flight, has the power to expand or spread the feathers when raising the wing to lessen the resistance, and the power to contract or reverse the action in the downward stroke. My third motion will produce the same or like effect.

Fourth. My fourth motion I call an elevator, and when working in conjunction with the wings will cause the machine to rise almost vertically from the place of starting.

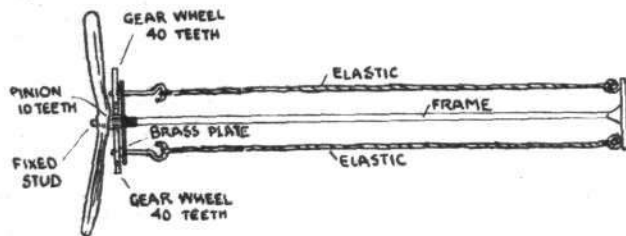
Leeds.

E. RICHARDSON.

ELASTIC MOTORS.

[266] In a recent issue I see a letter and description of a rubber motor from C. Bellamy, Askern Spa. I have wondered if Mr. Bellamy has tried his motor, or is it a misprint in the drawing, as I cannot see how he can get any great number of turns out of it. How does he do when the turns on the rubber get to the wide end of his wood frame? I have an E. Roota machine, which I could not get to fly with the propeller sent by the E. Roota people, but

when I got an 8-in. Cochrane on it it flew 80 yards first attempt. I have got several fine flights with it since. I use a geared elastic



motor of my own make. Perhaps it might be of service to some other FLIGHT readers.
Birkenhead.

G. R. CAMPBELL.

[267] I am building a small model biplane but can get no information as to how much twist an elastic motor will stand. I intend to have 32 strands of $\frac{1}{16}$ in. rubber 3 ft. in length. Can you or any of the readers of your interesting paper inform me how many turns such a skein ought to give?

Woolwich.

AEROSPORT.

[We do not happen to have experimented on the twist capacity of rubber strands, but possibly some of our readers may be able to supply an estimate of the motor in question.—ED.]

MODEL PROPELLERS.

[268] I should be greatly obliged for information as to method employed for ascertaining thrust of small screws (12 in.) so as to take into account all conditions tending to produce thrust. A calculation based on the velocity of the blast seems to ignore possible suction at the front surface of convex blades.

Is there any means within the reach of an ordinary amateur by which thrust can be directly measured at the spindle without introducing friction?

Also, what is a good way of finding the power used in driving the screw? Although destitute of mechanical and theoretical knowledge, I have been keenly interested by the articles and correspondence in FLIGHT, and should be grateful for information which would enable me to experiment.

N. Finchley.

F. C. HARROP.

[The useful thrust developed by a propeller is wholly represented by the force required to produce the blast which it creates. Air from a state of rest is accelerated to a state of motion and a force proportionate to the acceleration and the mass is required to create the change. That force has, by Newton's law, an equal and opposite reaction which in this case is known as the thrust of the propeller and as the force that drives the machine. Losses occur all along the transmission system which prevent the whole of the energy available on the crank-shaft of the engine being converted into thrust; among these losses is that due to the resistance of forcing the blades of the propeller edge on through the air.

Our correspondent asks, how can this loss be ascertained? Possibly some of our readers may have devised some rough-and-ready method which gives a fair indication of its practical value, and if so we hope they will communicate it to us. A really accurate investigation of this point in connection with full-size propellers is one that has not yet been carried out; but we believe engineers are at work upon it, and we have little doubt that their results will be satisfactory. They should go far towards an improvement in propeller efficiency, for they should provide data of a fundamental and reliable character, capable of being used as a ruling factor in design.

To the question of measuring thrust the above remarks also apply, and we would again draw attention to the importance of avoiding confusion between a propeller and a fan, the former being designed to create a thrust while moving and the latter to create a thrust while stationary.—ED.]

[269] Could you inform me through the medium of your paper on the following:—What is the best form for propeller blades of model aeroplanes? One in which the blade slopes away from 90° at the axis to 28° at tips, or (ii) 28° uniform over whole blade, or (iii) any other form?

If you could recommend a book that would answer the above and similar questions, it would probably save space in your columns.

Thanking you in anticipation,
Shettleston.

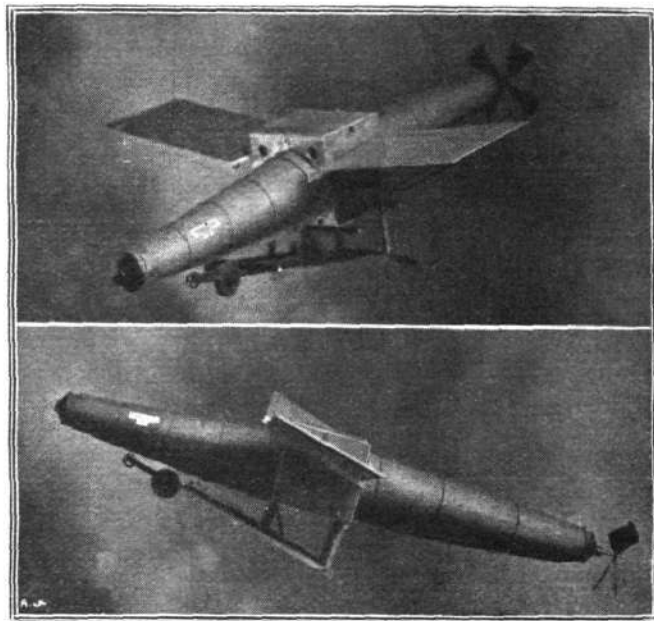
PROPELLER BLADES.

[The constant pitch screw is more correct than the constant angle screw, but it is common practice in full-sized propellers to change the pitch at some point along the blade according to the designer's ideas on the subject.

There is no book with which we are acquainted that would give just the sort of information our correspondent appears to require.—ED.]

AN EARLY MODEL.

[270] Ten or fifteen years ago I made a model to my own designs, which I called a brovoplane, of which I have pleasure in enclosing photographs. My only difficulty was to get a light engine, and I



am now preparing to build a machine on the same lines measuring 46 ft. long by 40 ft. span.

The principle combines the dirigible and the aeroplane, gas-bags, having a lifting power of about 150 lbs., being provided; the body and the wings are to be of aluminium.

Norton-on-Tees.

G. SMITH.

BRASS V. ALUMINIUM.

[271] You and your readers may be interested to hear that in building models a much more satisfactory material than aluminium is small brass tube. It may seem strange to say that this saves weight, but I find that building two models of the same size and strength that made of brass tube is considerably lighter. This is due to, first, the greater resisting strength of brass itself, and secondly, to the greater facility of making firm joints, both of which enable one to use tube of not more than half the diameter.

For my model, which is now nearly completed, and of which I will send you full particulars in a week or so, I am using brass tube of $\frac{3}{16}$ in. diameter, making the joints with "Tinol," combined flux and solder in paste form. The length of body is about 28 in., and I am certain that it would be impossible to build a model of this size and strength with any lighter material of the same diameter.

Ludgate Hill, E.C.

F. ALLEGDER ROBERTS.

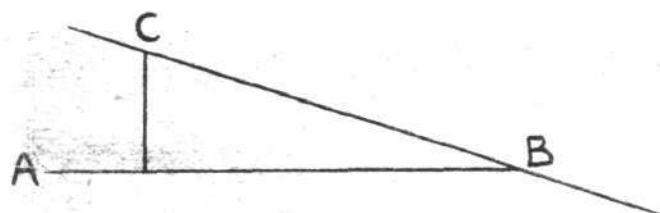
FLYERS ANALYSED.

[272] I worked out a table some time ago similar to one published by Mr. Evans, only I based the calculations on the official table you gave in FLIGHT of the aeroplanes at Rheims, and it differs somewhat from Mr. Evans'. I wonder which is right? I enclose list of machines I worked out.

One of your correspondents wants details of Farman's machine. I measured the camber at Blackpool, and made it about $3\frac{1}{2}$ ins. Since then I have received a cutting from the *Royal Engineers' Journal*, which gives the following information:—"The ribs are of poplar, weigh about 1½ lbs. each, and are spaced 18 ins. apart; the canvas on the ends and partitions is laced to the framework with whipcord and stiffened with slats, similar to those used in yacht sails. The supporting surfaces are formed to a curve fore and aft, similar to that of a bird's wing, the camber being about 4 ins., at 18 ins. from the front edge in the length of 7 ft., and diminishing from this point to nil at back and front. In the Goupy type the ribs of main planes are fixed at an angle to the uprights, so that when the machine is horizontal the planes are set at a lifting angle of about 1 in 10." (This means 5 per cent.)

From suitable photographs, I worked out, by getting the angle of machine, that the Voisin was set at an angle of 12 per cent. when the machine was running along the ground. The Antoinette wings at the tips are apparently at an angle (dihedral) of 4 per cent., i.e., if you drew a straight line from centre of machine to tip of wing, the latter would be raised 4 per cent.

I wonder if your readers know a very simple way of finding out suitable gliding slopes. I get my gliding angles with an Ordnance map. I mean, to find suitable places—and, of course, one has to know the country—but say, for instance, one locates a suitable hill



on the map, one measures A, B, horizontal distance from map, C = A C vertical drop from map, you then draw the line C, B, and measure with protractor A, B, C, which gives the gliding angle.

	Weight. lbs.	h.p.	Area. sq. ft.	lbs. per sq. ft.	lbs. per h.p.	Pro- peller. ft. in.	r.p.m.
Antoinette ...	1,138	50	500	2.2	22	7 2	1,100
Blériot (C.-C. type) ...	496	20	150 ³	3.3	24.8	6 5	1,400
Farman ...	1,212	50	410	2.9	24.2	8 3	1,200
Curtiss ...	550	30	265	2.0	18.3	6 0	1,300
Voisin ...	1,135	50	500	2.2	22.7	6 6	1,000
Wright ...	1,028	25	500	2.0	41	8 3	*450
Fernandez ...	1,050	50	500	2.1	21	6 6	1,100

* Wright geared 33 to 9.

Belfast.

LULIAN E. BLAND.

[The many and interesting points referred to above are of a character that will surely prove most useful to our readers, who cannot fail to appreciate, as we do, the desire to be of assistance that characterises our correspondent's letters.—ED.]

[273] The table prepared by Mr. K. H. Evans, and published in your issue of December 11th is, I think, the first attempt which has been made to tabulate and compare the main dimensions of the various "flyers," and is accordingly most valuable. I feel, however, that there is a tendency to lay too much stress on the nominal horse-power of the engine fitted, and one cannot help being struck by the fact that the substitution of a more powerful engine on a given machine has usually been found to have very little effect on its performance, except possibly in the direction of increased reliability.

This being so, I do not think that such comparisons are quite fair, unless what might be called "the minimum horse-power of flight," of the aeroplane in question, is known. If this is given, then the pounds lifted per horse-power developed in that particular machine seems to me to be the true criterion of efficiency. I cannot quite agree with Mr. Evans in his proposal to introduce the area of the wings into the expression, since the question of area seems unimportant. Is it not the overall dimensions which actually tell in comparing the convenience of one machine with another?

Again, I venture to think that it is somewhat unwise to apply the word "efficiency" to any such expression, seeing that this word has already a definite and well-known meaning in mechanics. The expression "figure of merit" is one often applied in analogous cases, and would, I think, meet the case.

For the reasons just given, I do not feel that "horse-power area per pound" is really what is wanted, and it seems to me that the true figure of merit is the ratio of weight lifted to propeller-thrust, that is, the weight lifted per pound thrust. This ratio can easily be measured in the case of a finished machine, since it is equal to the cotangent of the "least gliding angle," that is, the angle with the horizontal made by the path of an aeroplane when gliding to earth, in still air, with power shut off. For example, if in coming down from a height of 100 ft. the horizontal distance travelled over is 1,000 ft., the gliding angle is 1 in 10, and the "figure of merit" would consequently be 10. A very usual figure is 6 or 7; anything less than 4 must be considered as bad, and anything more than 8 is exceptionally good.

It would be extremely useful if makers could be induced to furnish this figure for their machines, but I have always, in the past, found them very reticent on this particular point.

KENELM EDGECUMBE.

[The above most interesting and valuable letter draws attention to matters which will certainly have to be investigated in the near future by those who are really working seriously at the problem of flight. So soon as aviators get accustomed to their machine and the first glamour of the air has worn off, a little experimental flying with a view to establishing reliable data relating to gliding angles and other matters of fundamental importance will, we hope, be strenuously practised.—ED.]

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